

LONGITUDINAL VARIATIONS OF THE LINEAR POLARIZATION
IN JUPITER'S POLAR REGIONS;

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During some last Jupiter apparition (between 1981 and 1989) the polarimetric observations of Jupiter were carried out using different techniques: photographic images in 1981 [1] and spectrograms in 1985 and 1986 obtained through two-refracting crystal and photopolarimetric equipment with CCD-line in 1989. Most of these observations used 4-inch telescope of the high-mountain observatory near Alma-Ata at altitude 2750 m above sea level. Main observations were connected with the measurements of the linear polarization degree along the central meridian of Jupiter especially for both polar regions where the value of polarization is sufficient to more or less reliable detection and analysis.

Some regularity was detected in the longitudinal variation of the polarization degree: all observations show the presence of two maxima and two minima of polarization if they are plotted versus the longitude at III system (rotation of Jovian magnetosphere). Although these extrema are not highly expressed and show some phase shift from year to year the calculations of correlation between the curves for different years have detected the presence of statistically significant correlation at the level of significance 0.01 and the systematic phase shift of about 50 degrees per year. The 1989 observations were separated into two groups (I - for 5, 14, 18 and 19 November and II - for 8 and 9 November, each of them with full longitudes covering) and were compared to estimate the reproducibility of results. Both curves for south polar region are in good mutual agreement, differing (mainly in phase) from the curves for north polar region which in their turn differ from each other.

The polarization curves presented in Fig.1 are plotted with the phase shift which was determined from the correlation comparison with data for 1981. Each point on this figure is value averaged over measurements within the 40 degrees longitude interval. The degree of polarization was measured for these curves on latitudes between 55 and 75 degrees. The mean year phase shift of 50 deg/yr corresponds to the rotation period which is approximately 5.6 sec shorter than period for III rotation system, that is about 9 h 55 m 24 s, and the position of curves on figure represents just the system with such period, this system coinciding in 1981 with the System III.

We should be limited by the notation of the detected peculiarities of the polarization in Jovian polar regions but it is interesting to note that some analogy may be found in the longitudinal variations of the Jovian decimetric radio emission polarization (see e.g. [2]). These variations follow the magnetosphere

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rotation and show also two maxima and two minima. Besides they have some more fine peculiarities depending on joventric declination of Earth. Their indirect analogy is traced in our data as well. It is plausible that there is the probable connection between the magnetospheric processes and variations of the aerosol concentration in the polar stratosphere of Jupiter which can be the reason of the observed variations of polarization. More detailed study and regular observations would be necessary.

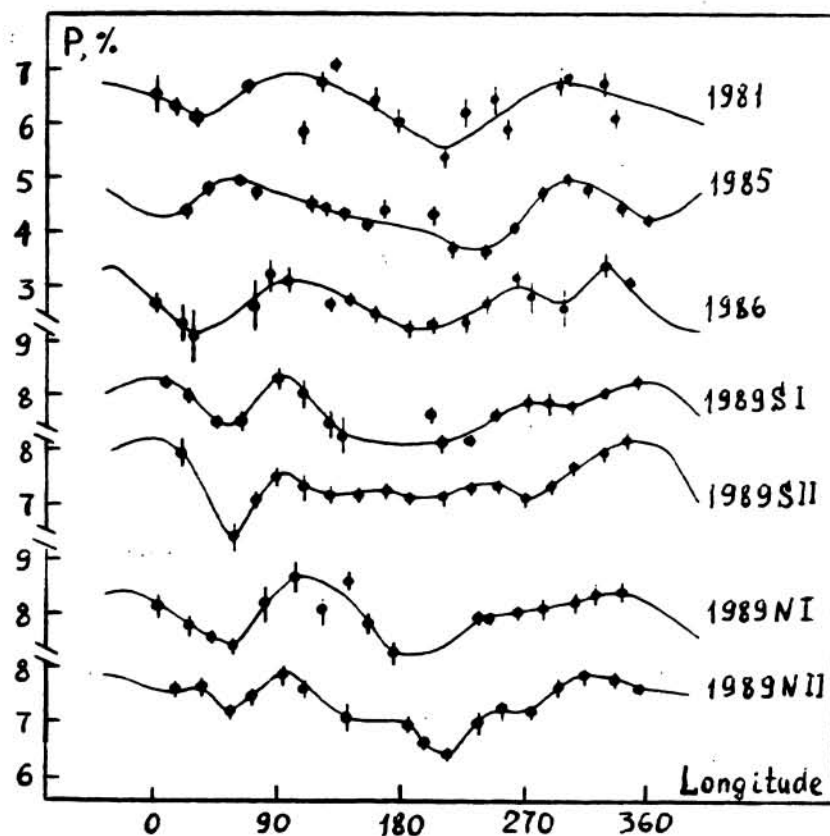


Fig.1

References: (1) Starodubtseva D.M., Tejfel V.G., *Astron. vestn.* 1984,18,N8,179 (in Russian). (2) Carr T.D., Desch M.D. and Alexander K. in "Physics of the Jovian Magnetosphere", A.J.Dessler (Ed.), 1983,226.